

US EPA

PROJECT: READFORD PROPELLANT
BURNS, SEPT. – OCT. 2016

CLIENT # U012
REPORT # 16-737

SUBMITTED BY:
CHESTER LabNet
12242 S.W. GARDEN PLACE
TIGARD, OR 97223
(503)624-2183/FAX (503)624-2653
www.ChesterLab.Net

CHESTER LabNet

12242 SW Garden Place ♦ Tigard, OR 97223-8246 ♦ USA
Telephone 503-624-2183 ♦ Fax 503-624-2653 ♦ www.chesterlab.net

Case Narrative

Date: November 8, 2016

General Information

Client: US EPA
Client Number: U012
Report Number: 16-737
Sample Description: 37mm Teflon filters

Analysis

Analytes: Particulate Mass, XRF Metals (Na – Pb)
Analytical Protocols: Gravimetry, X-Ray Fluorescence
Analytical Notes: Some of the samples had thicker than usual deposits and did not conform (DNC) to the thin film method. This resulted in high uncertainties for the analytes listed in the comments for each affected sample. Results have **not** been blank corrected.
QA/QC Review: All of the data have been reviewed by the analysts performing the analyses and the project manager. All of the quality control and sample-specific information in this package is complete and meets or exceeds the minimum requirements for acceptability.
Comments: If you have any questions or concerns regarding this analysis, please feel free to contact the project manager.
Disclaimer: This report shall not be reproduced, except in full, without the written approval of the laboratory. The results only represent that of the samples as received into the laboratory.



Project Manager
Paul Duda

11/8/16
Date

Lab ID: 14-T4414
Client ID: PS-RM-PM2.5-092716-01
Site: Radford Propellant Burns
Sample Date: 9/27/16
Filter Lot #: T22506
Deposit Area: 8.04 cm²
Size Fraction: PM2.5
Comments: Na DNC

Analyte	ug/filter		percent	
Gravimetry				
Net Mass	304. ± 10.			
XRF				
Na	15.70	± 2.115	5.165	± 0.7160
Mg	2.569	± 0.3634	0.8450	± 0.1227
* Al	0.0281	± 0.0756	0.0093	± 0.0249
Si	2.858	± 0.1857	0.9402	± 0.0685
* P	0.0699	± 0.0338	0.0230	± 0.0111
* S	0.0000	± 3.155	0.0000	± 1.038
Cl	0.8008	± 0.1214	0.2634	± 0.0409
K	0.6110	± 0.0434	0.2010	± 0.0157
Ca	0.6834	± 0.0442	0.2248	± 0.0163
Ti	0.0346	± 0.0080	0.0114	± 0.0027
* V	0.0000	± 0.0080	0.0000	± 0.0026
Cr	0.0233	± 0.0056	0.0077	± 0.0019
* Mn	0.0096	± 0.0096	0.0032	± 0.0032
Fe	0.2959	± 0.0209	0.0973	± 0.0076
* Co	0.0000	± 0.0072	0.0000	± 0.0024
* Ni	0.0000	± 0.0080	0.0000	± 0.0026
Cu	54.71	± 2.737	18.00	± 1.077
* Zn	0.0000	± 0.0096	0.0000	± 0.0032
Ga	0.1777	± 0.0523	0.0584	± 0.0173
Ge	0.1970	± 0.0209	0.0648	± 0.0072
* As	0.2476	± 0.1126	0.0815	± 0.0371
* Se	0.0000	± 0.0201	0.0000	± 0.0066
Br	0.2734	± 0.0193	0.0899	± 0.0070
Rb	0.1343	± 0.0161	0.0442	± 0.0055
* Sr	0.0281	± 0.0113	0.0093	± 0.0037
Y	0.2629	± 0.0330	0.0865	± 0.0112
* Zr	0.0000	± 0.0129	0.0000	± 0.0042
* Mo	0.0209	± 0.0129	0.0069	± 0.0042
* Pd	0.0394	± 0.0249	0.0130	± 0.0082
* Ag	0.0233	± 0.0241	0.0077	± 0.0079
* Cd	0.0225	± 0.0241	0.0074	± 0.0079
* In	0.0434	± 0.0249	0.0143	± 0.0082
* Sn	0.0000	± 0.0289	0.0000	± 0.0095
* Sb	0.0000	± 0.0306	0.0000	± 0.0100
Ba	0.1069	± 0.0257	0.0352	± 0.0085
La	0.0708	± 0.0177	0.0233	± 0.0059
* Hg	0.0000	± 0.0330	0.0000	± 0.0108
Pb	183.4	± 9.174	60.33	± 3.612

* - XRF Concentration is less than three times the uncertainty

Lab ID: 14-T4417
Client ID: PS-RM-PM2.5-092716-02
Site: Radford Propellant Burns
Sample Date: 9/27/16
Filter Lot #: T22506
Deposit Area: 8.04 cm²
Size Fraction: PM2.5

Analyte	ug/filter		percent	
Gravimetry				
Net Mass	107. ± 10.			
XRF				
Na	7.421	± 1.101	6.935	± 1.216
Mg	1.335	± 0.2058	1.248	± 0.2250
* Al	0.0000	± 0.0442	0.0000	± 0.0413
Si	0.9793	± 0.0748	0.9152	± 0.1104
* P	0.0177	± 0.0185	0.0165	± 0.0174
* S	0.0000	± 1.200	0.0000	± 1.122
Cl	0.5073	± 0.0756	0.4741	± 0.0834
K	0.2074	± 0.0217	0.1939	± 0.0272
Ca	0.1761	± 0.0177	0.1646	± 0.0226
* Ti	0.0000	± 0.0056	0.0000	± 0.0053
* V	0.0016	± 0.0040	0.0015	± 0.0038
* Cr	0.0040	± 0.0048	0.0038	± 0.0045
* Mn	0.0000	± 0.0080	0.0000	± 0.0075
Fe	0.1158	± 0.0113	0.1082	± 0.0146
* Co	0.0000	± 0.0048	0.0000	± 0.0045
* Ni	0.0000	± 0.0056	0.0000	± 0.0053
Cu	20.45	± 1.023	19.11	± 2.026
* Zn	0.0000	± 0.0064	0.0000	± 0.0060
* Ga	0.0426	± 0.0265	0.0398	± 0.0251
Ge	0.0547	± 0.0096	0.0511	± 0.0102
* As	0.0177	± 0.0547	0.0165	± 0.0511
* Se	0.0000	± 0.0096	0.0000	± 0.0090
Br	0.0844	± 0.0080	0.0789	± 0.0105
Rb	0.0675	± 0.0072	0.0631	± 0.0090
* Sr	0.0161	± 0.0064	0.0150	± 0.0062
Y	0.0595	± 0.0137	0.0556	± 0.0138
* Zr	0.0000	± 0.0080	0.0000	± 0.0075
* Mo	0.0056	± 0.0096	0.0053	± 0.0090
* Pd	0.0008	± 0.0201	0.0008	± 0.0188
* Ag	0.0000	± 0.0201	0.0000	± 0.0188
* Cd	0.0249	± 0.0201	0.0233	± 0.0189
* In	0.0137	± 0.0217	0.0128	± 0.0203
* Sn	0.0064	± 0.0265	0.0060	± 0.0248
* Sb	0.0000	± 0.0281	0.0000	± 0.0263
* Ba	0.0072	± 0.0185	0.0068	± 0.0173
* La	0.0105	± 0.0105	0.0098	± 0.0098
* Hg	0.0000	± 0.0161	0.0000	± 0.0150
Pb	70.48	± 3.527	65.87	± 6.983

* - XRF Concentration is less than three times the uncertainty

Lab ID: 14-T4420
Client ID: PS-MIC90-PM2.5-100516-01
Site: Radford Propellant Burns
Sample Date: 10/ 5/16
Filter Lot #: T22506
Deposit Area: 8.04 cm²
Size Fraction: PM2.5
Comments: Na Mg Ca DNC

Analyte	ug/filter		percent	
Gravimetry				
Net Mass	468. ± 10.			
XRF				
Na	31.34	± 4.773	6.697	± 1.030
Mg	5.776	± 0.8514	1.234	± 0.1838
* Al	0.0000	± 0.1897	0.0000	± 0.0405
Si	4.908	± 0.3473	1.049	± 0.0775
* P	0.1198	± 0.0852	0.0256	± 0.0182
* S	0.0000	± 1.176	0.0000	± 0.2513
* Cl	0.2613	± 0.1986	0.0558	± 0.0425
K	0.5901	± 0.0539	0.1261	± 0.0118
Ca	0.8321	± 0.0627	0.1778	± 0.0139
Ti	0.0474	± 0.0137	0.0101	± 0.0029
* V	0.0096	± 0.0113	0.0021	± 0.0024
Cr	0.0434	± 0.0096	0.0093	± 0.0021
* Mn	0.0000	± 0.0121	0.0000	± 0.0026
Fe	0.4502	± 0.0289	0.0962	± 0.0065
* Co	0.0000	± 0.0096	0.0000	± 0.0021
* Ni	0.0000	± 0.0105	0.0000	± 0.0022
Cu	100.3	± 5.017	21.44	± 1.166
* Zn	0.0000	± 0.0161	0.0000	± 0.0034
* Ga	0.0796	± 0.0900	0.0170	± 0.0192
Ge	0.3811	± 0.0378	0.0814	± 0.0083
As	0.6175	± 0.2050	0.1319	± 0.0439
* Se	0.0000	± 0.0354	0.0000	± 0.0076
Br	0.4985	± 0.0354	0.1065	± 0.0079
Rb	0.2999	± 0.0297	0.0641	± 0.0065
* Sr	0.0000	± 0.0217	0.0000	± 0.0046
Y	0.3723	± 0.0571	0.0795	± 0.0123
* Zr	0.0000	± 0.0225	0.0000	± 0.0048
* Mo	0.0016	± 0.0217	0.0003	± 0.0046
* Pd	0.0040	± 0.0330	0.0009	± 0.0070
* Ag	0.0000	± 0.0314	0.0000	± 0.0067
* Cd	0.0965	± 0.0330	0.0206	± 0.0071
* In	0.0619	± 0.0338	0.0132	± 0.0072
Sn	0.2275	± 0.0402	0.0486	± 0.0087
* Sb	0.0965	± 0.0402	0.0206	± 0.0086
Ba	0.1970	± 0.0458	0.0421	± 0.0098
La	0.1632	± 0.0306	0.0349	± 0.0066
* Hg	0.0000	± 0.0603	0.0000	± 0.0129
Pb	338.2	± 16.92	72.26	± 3.930

* - XRF Concentration is less than three times the uncertainty

Lab ID: 14-T4421
Client ID: PS-MIC90-PM2.5-100516-02
Site: Radford Propellant Burns
Sample Date: 10/ 5/16
Filter Lot #: T22506
Deposit Area: 8.04 cm²
Size Fraction: PM2.5
Comments: Na DNC

Analyte	ug/filter		percent	
Gravimetry				
Net Mass	358. ± 10.			
XRF				
Na	21.27	± 3.427	5.940	± 0.9717
Mg	3.785	± 0.6159	1.057	± 0.1745
* Al	0.2709	± 0.1367	0.0757	± 0.0382
Si	3.509	± 0.2468	0.9803	± 0.0742
* P	0.1206	± 0.0603	0.0337	± 0.0169
* S	0.0000	± 3.920	0.0000	± 1.095
Cl	0.5001	± 0.1439	0.1397	± 0.0404
K	0.5242	± 0.0434	0.1464	± 0.0128
Ca	0.6014	± 0.0434	0.1680	± 0.0130
* Ti	0.0201	± 0.0096	0.0056	± 0.0027
* V	0.0048	± 0.0096	0.0013	± 0.0027
Cr	0.0338	± 0.0080	0.0094	± 0.0023
* Mn	0.0032	± 0.0105	0.0009	± 0.0029
Fe	0.4374	± 0.0273	0.1222	± 0.0084
* Co	0.0000	± 0.0080	0.0000	± 0.0022
* Ni	0.0000	± 0.0088	0.0000	± 0.0025
Cu	70.90	± 3.546	19.80	± 1.135
* Zn	0.0000	± 0.0129	0.0000	± 0.0036
* Ga	0.0772	± 0.0635	0.0216	± 0.0178
Ge	0.2275	± 0.0265	0.0636	± 0.0076
As	0.4615	± 0.1447	0.1289	± 0.0406
* Se	0.0257	± 0.0249	0.0072	± 0.0070
Br	0.3272	± 0.0241	0.0914	± 0.0072
Rb	0.2002	± 0.0209	0.0559	± 0.0060
* Sr	0.0201	± 0.0145	0.0056	± 0.0040
Y	0.1986	± 0.0386	0.0555	± 0.0109
* Zr	0.0000	± 0.0169	0.0000	± 0.0047
* Mo	0.0273	± 0.0169	0.0076	± 0.0047
* Pd	0.0000	± 0.0273	0.0000	± 0.0076
* Ag	0.0000	± 0.0273	0.0000	± 0.0076
* Cd	0.0370	± 0.0273	0.0103	± 0.0076
* In	0.0040	± 0.0297	0.0011	± 0.0083
* Sn	0.0338	± 0.0338	0.0094	± 0.0094
* Sb	0.0000	± 0.0354	0.0000	± 0.0099
Ba	0.1367	± 0.0338	0.0382	± 0.0095
La	0.1254	± 0.0233	0.0350	± 0.0066
* Hg	0.0000	± 0.0410	0.0000	± 0.0115
Pb	225.8	± 11.30	63.06	± 3.614

* - XRF Concentration is less than three times the uncertainty

Lab ID: 14-T4419
Client ID: PS-MIC90-PM2.5-100516-03
Site: Radford Propellant Burns
Sample Date: 10/ 5/16
Filter Lot #: T22506
Deposit Area: 8.04 cm²
Size Fraction: PM2.5
Comments: Na Mg Ca DNC

Analyte	ug/filter		percent	
Gravimetry				
Net Mass	493. ± 10.			
XRF				
Na	22.69	± 4.485	4.602	± 0.9145
Mg	4.271	± 0.8346	0.8663	± 0.1702
* Al	0.2420	± 0.1914	0.0491	± 0.0388
Si	4.746	± 0.3361	0.9627	± 0.0709
* P	0.1769	± 0.0812	0.0359	± 0.0165
* S	0.0000	± 1.041	0.0000	± 0.2112
* Cl	0.2718	± 0.1954	0.0551	± 0.0396
K	0.7405	± 0.0595	0.1502	± 0.0124
Ca	0.8547	± 0.0611	0.1734	± 0.0129
Ti	0.0619	± 0.0137	0.0126	± 0.0028
* V	0.0000	± 0.0113	0.0000	± 0.0023
Cr	0.0410	± 0.0096	0.0083	± 0.0020
* Mn	0.0000	± 0.0121	0.0000	± 0.0024
Fe	0.4334	± 0.0281	0.0879	± 0.0060
* Co	0.0000	± 0.0105	0.0000	± 0.0021
* Ni	0.0000	± 0.0113	0.0000	± 0.0023
Cu	100.3	± 5.014	20.34	± 1.097
* Zn	0.0000	± 0.0161	0.0000	± 0.0033
* Ga	0.0000	± 0.0868	0.0000	± 0.0176
Ge	0.4719	± 0.0394	0.0957	± 0.0082
As	0.8876	± 0.2026	0.1800	± 0.0413
* Se	0.0209	± 0.0346	0.0042	± 0.0070
Br	0.5210	± 0.0362	0.1057	± 0.0076
Rb	0.2139	± 0.0273	0.0434	± 0.0056
Sr	0.0740	± 0.0193	0.0150	± 0.0039
Y	0.3168	± 0.0547	0.0643	± 0.0112
* Zr	0.0000	± 0.0225	0.0000	± 0.0046
* Mo	0.0362	± 0.0217	0.0073	± 0.0044
* Pd	0.0651	± 0.0322	0.0132	± 0.0065
* Ag	0.0000	± 0.0314	0.0000	± 0.0064
* Cd	0.0185	± 0.0322	0.0038	± 0.0065
* In	0.0675	± 0.0330	0.0137	± 0.0067
* Sn	0.0096	± 0.0378	0.0020	± 0.0077
* Sb	0.0466	± 0.0402	0.0095	± 0.0082
Ba	0.2106	± 0.0450	0.0427	± 0.0092
La	0.1487	± 0.0297	0.0302	± 0.0061
* Hg	0.0000	± 0.0563	0.0000	± 0.0114
Pb	325.9	± 16.31	66.11	± 3.569

* - XRF Concentration is less than three times the uncertainty

Lab ID: 14-T4418
Client ID: BS-PM2.5-100516
Site: Radford Propellant Burns
Sample Date: 10/ 5/16
Filter Lot #: T22506
Deposit Area: 8.04 cm²
Size Fraction: PM2.5

Analyte	ug/filter		percent	
<hr/>				
Gravimetry				
Net Mass	10. ± 10.			
XRF				
* Na	0.7485	± 0.4004	7.485	± 8.489
* Mg	0.1005	± 0.0836	1.005	± 1.307
* Al	0.0000	± 0.0201	0.0000	± 0.2010
* Si	0.0000	± 0.0161	0.0000	± 0.1608
* P	0.0000	± 0.0072	0.0000	± 0.0724
S	0.1584	± 0.0113	1.584	± 1.588
* Cl	0.0000	± 0.0161	0.0000	± 0.1608
* K	0.0000	± 0.0096	0.0000	± 0.0965
* Ca	0.0080	± 0.0080	0.0804	± 0.1137
* Ti	0.0000	± 0.0040	0.0000	± 0.0402
* V	0.0064	± 0.0032	0.0643	± 0.0719
* Cr	0.0072	± 0.0048	0.0724	± 0.0870
* Mn	0.0000	± 0.0056	0.0000	± 0.0563
* Fe	0.0056	± 0.0056	0.0563	± 0.0796
* Co	0.0000	± 0.0032	0.0000	± 0.0322
* Ni	0.0008	± 0.0032	0.0080	± 0.0331
Cu	0.0185	± 0.0040	0.1849	± 0.1892
Zn	0.0129	± 0.0040	0.1286	± 0.1348
* Ga	0.0088	± 0.0153	0.0884	± 0.1765
* Ge	0.0000	± 0.0040	0.0000	± 0.0402
* As	0.0032	± 0.0032	0.0322	± 0.0455
Se	0.0121	± 0.0032	0.1206	± 0.1248
* Br	0.0016	± 0.0024	0.0161	± 0.0290
* Rb	0.0000	± 0.0032	0.0000	± 0.0322
* Sr	0.0000	± 0.0032	0.0000	± 0.0322
* Y	0.0080	± 0.0040	0.0804	± 0.0899
* Zr	0.0000	± 0.0056	0.0000	± 0.0563
* Mo	0.0056	± 0.0080	0.0563	± 0.0981
* Pd	0.0000	± 0.0161	0.0000	± 0.1608
* Ag	0.0000	± 0.0161	0.0000	± 0.1608
* Cd	0.0000	± 0.0161	0.0000	± 0.1608
* In	0.0000	± 0.0177	0.0000	± 0.1769
* Sn	0.0056	± 0.0225	0.0563	± 0.2320
* Sb	0.0000	± 0.0257	0.0000	± 0.2573
* Ba	0.0000	± 0.0145	0.0000	± 0.1447
* La	0.0233	± 0.0080	0.2332	± 0.2466
* Hg	0.0000	± 0.0080	0.0000	± 0.0804
* Pb	0.0072	± 0.0072	0.0724	± 0.1023

* - XRF Concentration is less than three times the uncertainty

Lab ID: 15-T3152
Client ID: PS-SW-PM2.5-100616-01
Site: Radford Propellant Burns
Sample Date: 10/ 6/16
Filter Lot #: T22506
Deposit Area: 8.04 cm²
Size Fraction: PM2.5

Analyte	ug/filter		percent	
Gravimetry				
Net Mass	263. ± 10.			
XRF				
* Na	3.319	± 1.674	1.262	± 0.6383
* Mg	0.2291	± 0.1544	0.0871	± 0.0588
* Al	0.0000	± 0.0732	0.0000	± 0.0278
Si	2.281	± 0.1592	0.8673	± 0.0689
* P	0.0515	± 0.0289	0.0196	± 0.0110
* S	0.0000	± 0.2106	0.0000	± 0.0801
Cl	8.482	± 0.4430	3.225	± 0.2084
K	5.153	± 0.2669	1.959	± 0.1259
Ca	0.2862	± 0.0265	0.1088	± 0.0109
Ti	0.0297	± 0.0064	0.0113	± 0.0025
* V	0.0040	± 0.0040	0.0015	± 0.0015
* Cr	0.0032	± 0.0048	0.0012	± 0.0018
* Mn	0.0000	± 0.0064	0.0000	± 0.0024
Fe	0.1053	± 0.0113	0.0400	± 0.0045
* Co	0.0000	± 0.0040	0.0000	± 0.0015
* Ni	0.0000	± 0.0040	0.0000	± 0.0015
Cu	3.044	± 0.1536	1.157	± 0.0731
Zn	0.3594	± 0.0201	0.1366	± 0.0092
* Ga	0.0000	± 0.0233	0.0000	± 0.0089
Ge	0.0563	± 0.0080	0.0214	± 0.0032
* As	0.1206	± 0.0490	0.0459	± 0.0187
* Se	0.0000	± 0.0080	0.0000	± 0.0031
Br	0.1423	± 0.0096	0.0541	± 0.0042
Rb	0.0772	± 0.0072	0.0293	± 0.0030
* Sr	0.0032	± 0.0048	0.0012	± 0.0018
Y	0.0732	± 0.0121	0.0278	± 0.0047
* Zr	0.0000	± 0.0064	0.0000	± 0.0024
* Mo	0.0040	± 0.0080	0.0015	± 0.0031
* Pd	0.0105	± 0.0185	0.0040	± 0.0070
* Ag	0.0000	± 0.0185	0.0000	± 0.0070
* Cd	0.0233	± 0.0177	0.0089	± 0.0067
* In	0.0000	± 0.0193	0.0000	± 0.0073
* Sn	0.0096	± 0.0241	0.0037	± 0.0092
* Sb	0.0000	± 0.0257	0.0000	± 0.0098
* Ba	0.0233	± 0.0177	0.0089	± 0.0067
* La	0.0024	± 0.0113	0.0009	± 0.0043
* Hg	0.0000	± 0.0145	0.0000	± 0.0055
Pb	64.97	± 3.251	24.70	± 1.553

* - XRF Concentration is less than three times the uncertainty

Lab ID: 15-T3151
Client ID: PS-SW-PM2.5-100616-02
Site: Radford Propellant Burns
Sample Date: 10/ 6/16
Filter Lot #: T22506
Deposit Area: 8.04 cm²
Size Fraction: PM2.5

Analyte	ug/filter		percent	
Gravimetry				
Net Mass	237. ± 10.			
XRF				
* Na	4.223	± 1.570	1.782	± 0.6668
* Mg	0.2854	± 0.1399	0.1204	± 0.0592
* Al	0.0000	± 0.0635	0.0000	± 0.0268
Si	2.216	± 0.1487	0.9349	± 0.0741
* P	0.0699	± 0.0273	0.0295	± 0.0116
* S	0.0000	± 0.2340	0.0000	± 0.0987
Cl	8.788	± 0.4583	3.708	± 0.2487
K	4.281	± 0.2227	1.806	± 0.1210
Ca	0.1914	± 0.0217	0.0807	± 0.0098
* Ti	0.0121	± 0.0056	0.0051	± 0.0024
* V	0.0000	± 0.0040	0.0000	± 0.0017
* Cr	0.0048	± 0.0040	0.0020	± 0.0017
* Mn	0.0000	± 0.0072	0.0000	± 0.0031
* Fe	0.0185	± 0.0072	0.0078	± 0.0031
* Co	0.0000	± 0.0040	0.0000	± 0.0017
* Ni	0.0008	± 0.0032	0.0003	± 0.0014
Cu	0.9222	± 0.0474	0.3891	± 0.0259
Zn	1.188	± 0.0611	0.5014	± 0.0334
* Ga	0.0000	± 0.0249	0.0000	± 0.0105
Ge	0.0828	± 0.0096	0.0349	± 0.0043
As	0.1857	± 0.0563	0.0784	± 0.0240
* Se	0.0000	± 0.0088	0.0000	± 0.0037
Br	0.1825	± 0.0121	0.0770	± 0.0060
Rb	0.0949	± 0.0080	0.0400	± 0.0038
* Sr	0.0000	± 0.0056	0.0000	± 0.0024
Y	0.0957	± 0.0145	0.0404	± 0.0063
* Zr	0.0000	± 0.0064	0.0000	± 0.0027
* Mo	0.0000	± 0.0080	0.0000	± 0.0034
* Pd	0.0000	± 0.0193	0.0000	± 0.0081
* Ag	0.0201	± 0.0185	0.0085	± 0.0078
* Cd	0.0000	± 0.0185	0.0000	± 0.0078
* In	0.0016	± 0.0201	0.0007	± 0.0085
* Sn	0.0000	± 0.0241	0.0000	± 0.0102
* Sb	0.0000	± 0.0257	0.0000	± 0.0109
* Ba	0.0273	± 0.0169	0.0115	± 0.0071
* La	0.0153	± 0.0113	0.0064	± 0.0048
* Hg	0.0000	± 0.0161	0.0000	± 0.0068
Pb	79.64	± 3.985	33.61	± 2.200

* - XRF Concentration is less than three times the uncertainty

CHESTER LabNet

XRF-772

XRF Analytical Quality Assurance Report

Client: US EPA

Report: 16-737

Analysis Period: November 3, 2016

Number of Samples: 8

1. Precision Data

Micromatter Multi-elemental Quality Control Standard: QS285

QC Standard Results

Analyte	n	Counts per Second			c.v.	%E
		Calib.	Meas.	S.D.		
Si(0)	1	981.41	954.90	na	na	-2.70
Ti(1)	1	567.81	580.34	na	na	2.21
Fe(1)	1	1242.11	1254.72	na	na	1.02
Se(3)	1	403.25	425.35	na	na	5.48
Pb(3)	1	463.80	485.84	na	na	4.75
Cd(4)	1	149.01	153.36	na	na	2.92

2. Accuracy Data

NIST Standard Reference Materials: SRM 1832, SRM 1833, SRM 2783

Analyte/ SRM	n	Certified Value($\mu\text{g}/\text{cm}^2$)	Measured Value ($\mu\text{g}/\text{cm}^2$)			% Rec.
			High	Low	Average	
Al 1832	4	14.6 +/- .97	14.50	14.19	14.33 +/- 0.11	98.1
Si 1832	4	34.0 +/- 1.1	37.70	36.22	36.85 +/- 0.57	108.4
Si 1833	4	31.5 +/- 2.1	32.36	31.90	32.12 +/- 0.21	102.0
S 2708	4	2.46 +/- .25	2.28	2.25	2.26 +/- 0.01	91.9
K 2783	4	.530 +/- .052	0.54	0.53	0.53 +/- 0.01	100.9
Ca 2783	4	1.33 +/- 0.17	1.35	1.33	1.34 +/- 0.01	101.1
Ti 1833	4	12.1 +/- 1.79	12.62	12.33	12.52 +/- 0.12	103.5
V 1832	4	4.70 +/- .49	4.55	4.41	4.47 +/- 0.05	95.2
Mn 1832	4	4.54 +/- .49	4.86	4.74	4.82 +/- 0.04	106.1
Fe 1833	4	13.6 +/- .45	13.36	13.27	13.33 +/- 0.04	98.0
Cu 1832	4	2.43 +/- .16	2.65	2.62	2.64 +/- 0.01	108.6
Zn 2783	4	.180 +/- .013	0.19	0.19	0.19 +/- 0.00	104.2
Pb 1833	4	16.1 +/- .75	16.39	16.11	16.25 +/- 0.10	100.9

NIST: National Institute of Standards and Technology

% Rec: Percent Recovery = (Experimental/Given) x 100

n: Number of Observations

S.D.: Standard Deviation

c.v.: Coefficient of Variation = (S.D./Measured) x 100

% E: Percent Error = [(Measured-Calibrated)/Calibrated] x 100

XRF-772 REPLICATE REPORT

2.16

Original ID: 14-T4420

Replicate ID: RT4420

Filter Lot:

Deposit Mass: 468 μg Deposit Area: 8.0 cm^2

Particle Size: F

Element	Original $\mu\text{g}/\text{cm}^2$		Replicate $\mu\text{g}/\text{cm}^2$		Difference $\mu\text{g}/\text{cm}^2$		RPD						
Na	3.8983	+ -	0.5936	3.6059	+ -	0.4725	0.2924	+ -	0.7587	+	7.8	+ -	20.2
Mg	0.7184	+ -	0.1059	0.6251	+ -	0.0811	0.0933	+ -	0.1334	+	13.9	+ -	19.9
Al	0.0000	+ -	0.0236	0.0000	+ -	0.0163	0.0000	+ -	0.0287				
Si	0.6105	+ -	0.0432	0.5795	+ -	0.0378	0.0310	+ -	0.0574	+	5.2	+ -	9.6
P	0.0149	+ -	0.0106	0.0241	+ -	0.0071	-0.0092	+ -	0.0128				
S	0.0000	+ -	0.1463	0.0000	+ -	0.1413	0.0000	+ -	0.2034				
Cl	0.0325	+ -	0.0247	0.1833	+ -	0.0273	-0.1508	+ -	0.0368				
K	0.0734	+ -	0.0067	0.0747	+ -	0.0067	-0.0013	+ -	0.0095	+	-1.8	+ -	12.8
Ca	0.1035	+ -	0.0078	0.1224	+ -	0.0084	-0.0189	+ -	0.0115	0	-16.7	+ -	10.2
Ti	0.0059	+ -	0.0017	0.0021	+ -	0.0032	0.0038	+ -	0.0036	0	94.7	+ -	89.4
V	0.0012	+ -	0.0014	0.0000	+ -	0.0015	0.0012	+ -	0.0021				
Cr	0.0054	+ -	0.0012	0.0049	+ -	0.0012	0.0006	+ -	0.0018	+	11.3	+ -	34.3
Mn	0.0000	+ -	0.0015	0.0000	+ -	0.0015	0.0000	+ -	0.0022				
Fe	0.0560	+ -	0.0036	0.0535	+ -	0.0035	0.0025	+ -	0.0050	+	4.6	+ -	9.1
Co	0.0000	+ -	0.0012	0.0000	+ -	0.0013	0.0000	+ -	0.0018				
Ni	0.0000	+ -	0.0013	0.0000	+ -	0.0013	0.0000	+ -	0.0019				
Cu	12.4758	+ -	0.6240	12.5553	+ -	0.6280	-0.0795	+ -	0.8853	+	-0.6	+ -	7.1
Zn	0.0000	+ -	0.0020	0.0000	+ -	0.0020	0.0000	+ -	0.0028				
Ga	0.0099	+ -	0.0112	0.0009	+ -	0.0112	0.0090	+ -	0.0158				
Ge	0.0474	+ -	0.0047	0.0419	+ -	0.0046	0.0055	+ -	0.0066	+	12.2	+ -	14.8
As	0.0768	+ -	0.0255	0.1245	+ -	0.0263	-0.0477	+ -	0.0366	0	-47.4	+ -	36.4
Se	0.0000	+ -	0.0044	0.0000	+ -	0.0045	0.0000	+ -	0.0063				
Br	0.0620	+ -	0.0044	0.0651	+ -	0.0045	-0.0031	+ -	0.0063	+	-4.9	+ -	10.0
Rb	0.0373	+ -	0.0037	0.0442	+ -	0.0038	-0.0069	+ -	0.0053	0	-17.0	+ -	13.0
Sr	0.0000	+ -	0.0027	0.0000	+ -	0.0027	0.0000	+ -	0.0038				
Y	0.0463	+ -	0.0071	0.0604	+ -	0.0074	-0.0141	+ -	0.0103	0	-26.5	+ -	19.3
Zr	0.0000	+ -	0.0028	0.0000	+ -	0.0028	0.0000	+ -	0.0040				
Mo	0.0002	+ -	0.0027	0.0041	+ -	0.0027	-0.0038	+ -	0.0038				
Pd	0.0005	+ -	0.0041	0.0061	+ -	0.0041	-0.0056	+ -	0.0058				
Ag	0.0000	+ -	0.0039	0.0085	+ -	0.0040	-0.0085	+ -	0.0056				
Cd	0.0120	+ -	0.0041	0.0054	+ -	0.0040	0.0066	+ -	0.0058				
In	0.0077	+ -	0.0042	0.0000	+ -	0.0042	0.0077	+ -	0.0059				
Sn	0.0283	+ -	0.0050	0.0213	+ -	0.0048	0.0070	+ -	0.0069	0	28.2	+ -	27.6
Sb	0.0120	+ -	0.0050	0.0000	+ -	0.0051	0.0120	+ -	0.0071				
Ba	0.0245	+ -	0.0057	0.0351	+ -	0.0060	-0.0105	+ -	0.0082	0	-35.4	+ -	27.7
La	0.0203	+ -	0.0038	0.0184	+ -	0.0037	0.0019	+ -	0.0053	+	9.8	+ -	27.5
Hg	0.0000	+ -	0.0075	0.0000	+ -	0.0073	0.0000	+ -	0.0105				
Pb	42.0626	+ -	2.1045	42.3808	+ -	2.1204	-0.3182	+ -	2.9874	+	-0.8	+ -	7.1

RPD: Relative Percent Difference $(X_1 - X_2) / [(X_1 + X_2) / 2] * 100$. RPD is calculated when original value is greater than three times its uncertainty.

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

PM25

16-737

SAMPLER:**Requested Analyses**

SAMPLE ID	DATE	TIME	MATRIX	PM	Filter #	Requested Analyses										Remarks
						1	2	3	4	5	6	7	8	9	10	
1 PS-RM-PM25-092716-01	092716	MIC90	Burn#1	PM25	14-T4414	X	X									Lmp # 1
2 PS-RM-PM25-092716-02	092716	MIC90	Burn# 2,3	PM25	14-T4417	X	X									Lmp# 4
3 PS-MIC90-PM25-100516-01	100516	MIC90	Burn#1	PM25	14-T4420	X	X									Lmp# 1
4 PS-MIC90-PM25-100516-02	100516	MIC90	Burn#2	PM25	14-T4421	X	X									4
5 PS-MIC90-PM25-100516-03	100516	MIC90	Burn#3	PM25	14-T4422	X	X									7
6 BS-PM25-100516	100516		Ambient	PM25	14-T4418	X	X									6
7 PS-SW-PM25-100616-01	100616	SW	Burn#1	PM25	15-T3152	X	X									
8 PS-SW-PM25-100616-02	100616	SW	Burn#1	PM25	15-T3151	X	X									

Requested Analyses	Special Instructions/Comments:	<input type="checkbox"/> Special QA/QC Instructions						
1 Weight								
2 XRF	Laboratory Information and Receipt							
3	Lab Name: Shipping Tracking #	<input type="checkbox"/> Cooler packed with ice	Sample Receipt:					
4	Specify Turnaround Requirements:	<input type="checkbox"/> Cooler custody seal intact	Condition/Cooler Temp:					
5	Relinquished by: <i>John Ball</i>	DATE 10/11/16	TIME 10:05	Received by: <i>John Ball</i> 10/11/16	Relinquished by:	DATE	TIME	Received by:
6	Relinquished by:	DATE	TIME	Received by:	Relinquished by:	DATE	TIME	Received by:
7								

RAW DATA

Available upon request